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A. Smith et al.

Response to Office Action and Request for Reconsideration

REMARKS

Claims 44-47 and 50-54 are pending in this continuation application. Attached hereto is a complete listing of all claims in the application, with their current status listed parenthetically.

RESPONSE TO ARGUMENT

Applicant submits that the Examiner's response to argument displays a fundamental misunderstanding of the present invention. All claims in the present application are directed toward an invention that includes the use of complementary attributes. In the Final Office the Examiner's Response to Arguments the Examiner states:

"However the Examiner believes the alignment attributes pointed out in the rejection does read on the claimed recitation. The Applicant does not specifically define the term "complementary" and according to the dictionary definition of "complementary" the term conveys a meaning "expressing or containing a complement" or "given free as a courtesy or favor." Since the provided claims do not specifically describe the positional relativity as to what the term "complementary conveys in the attributes, the Examiner believes the term "complementary can be broadly interpreted as an attribute being either positional opposite, next to or close to another attribute."

The Examiner is respectfully invited to read the current specification, paying special attention to FIGs. 1, 12 and 21 and page 22 where it states the following.

"Alignment attributes 1 and 2 form a complementary pair, when combined by projecting and overlaying them one upon another they form a completed, readable alignment attribute, examples of which are shown in Figure 1 and in more detail in Figure 12A. Alignment attributes or features 1 are offset in distinct orthogonal directions from feature 2 by a distance $M \cdot dp$." (Page 22, lines 9:14)

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Applicant believes this statement demonstrates a misunderstanding that may be part of the basis for the Examiner's rejection to the claims of the present invention. Accordingly, the Examiner is invited to read the cited portion of the specification. The Applicant respectfully requests the Examiner reconsider and withdraw his rejections.

Further, the Examiner's discussion related to Ausschnitt's attributes 132, 134, 140 and 142 are further evidence of this fundamental misunderstanding. The Examiner is respectfully invited to contrast FIGs 1, 21 and 41 of the present application with FIG 18 of Ausschnitt. Claims in the present invention are directed toward the use of sets of complementary attributes. The Examiner's misinterpretation of claim terms has led to maintaining an improper rejection. The applicant respectfully invites the examiner to read the cited portions of the specification, review the cited figures, reconsider and withdraw the rejection to the present claims.

Additionally, the Examiner's assertion in his remarks "Although the combination may disclose each and every error component, the Applicant does not specifically disclose that the overlay map can be produced using any of the individual components."

Once again, the Examiner is invited to read the specification paying special attention to the discussion beginning on page 26 line 15 through page 29 line 2. Further, the Examiner is invited to read page 32.

Rejection Under 35 U.S.C. § 103

In paragraphs 2 and 3 of the Office Action, claims 44, 50 and 51 stand rejected as unpatentable under 35 U.S.C. § 103(a) over U.S. patent 5,505,290 ("Ausschnitt") in view of U.S. Patent 6,269,322 ("Templeton"). Applicant respectfully traverses this rejection.

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The Law of Obviousness

In order to establish a *prima facie* case of obviousness, three basic criteria must be met:

"First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined), must teach or suggest all of the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the applicant's disclosure." M.P.E.P. § 2142. (Emphasis added)

1. The Proposed Combination Fails to Teach Basic Elements.

In paragraph 3 of the Office Action the Examiner states:

"Ausschnitt '290 fails to teach a stage that is shifted in a desired direction relative to the reticle. Ausschnitt '290 also fails to teach the offset measurements of the exposed alignment attributes are used to determine a self referenced wafer stage overlay error map. Templeton discloses a wafer stage 160 that is movable in the x-direction and y-direction."

As explained above, the Office Action makes a Section 103 rejection by combining Ausschnitt with Templeton. Because a modification to the prior art is required to support this 35 U.S.C. section 103 rejection, an appropriate motivation to modify must be set forth in order to establish a *prima facie* case of obviousness. See, *In re Fritch*, 972 F.2d 1266 (Fed. Cir. 1992)

Even if these references were combined, albeit improperly, they would still not teach all of the elements recited in independent claims 44, 50, and 51. Specifically, the combination fails to teach multiple sets of alignment attributes. Claim 44 recites "a first set of alignment attributes disposed along a first column; a second set ... disposed along a second column... a third set... and a fourth set." Claim 50 recites a "means for producing a first set of alignment attributes ... means for producing a second set ...

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means for producing a third set ... and means for producing a fourth set... ." Amended claim 51 includes "at least two sets of alignment attributes".

In contrast, Ausschnitt's attributes cited by the Examiner do not constitute more than one set of attributes within the context of the present invention. The present invention precisely defines a set of attributes when it states "[a]lignment attributes 1 and 2 form a complimentary pair, when combined by projecting and overlaying them one upon another they form a completed, readable alignment attribute." (page 22, lines 9-12). This is additionally illustrated in FIGs. 1 and 12A. The attributes taught in Ausschnitt would constitute, in combination, one set. This is not a trivial distinction. The present invention employs the use of more than one set of attributes laid out across the reticle. (see figures 21, 40, 41, and 45)

In the context of Applicant's invention and claims, and for the purpose of establishing a clear and non-ambiguous prosecution history, the claim elements contained in dependent claims 44, 50, and 51 referring to "a set of attributes". This aspect of the invention, as defined by the Applicant, means "a complimentary pair, when combined by projecting and overlaying them one upon another they form a completed, readable alignment attribute". (Page 22, lines 9-12)

Stated differently to clearly point out the distinction, attributes taught in Ausschnitt, the 1st and 3rd (140 and 142 in FIG 18) are not complimentary to the 2nd and 4th (132 and 134) as defined by the Examiner. Taken together attributes 132, 134, 140, and 142 make up only the outer portion of a frame-in-frame completed alignment attribute (FIG 1 of the present invention) and by themselves cannot be used to measure X-Y shifts on an overlay metrology tool.

Additionally, this combination fails to teach, suggest or imply sets of complementary alignment attributes that interlock "after the reticle has been shifted a desired direction" as recited in independent claim 44 and 50, nor does this combination teach, suggest or imply the limitation "creating an interlocking row or column of

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completed attributes, such that positional offsets of the alignment attributes in the interlocking row or column of completed attributes" as recited in independent claim 51.

Further, the proposed combination fails to teach a combination useful "to determine a self referenced wafer stage overlay error map" As is known in the art, product wafer overlay errors are for a combination of reticle, stage, lens, and alignment mark detection errors. The proposed combination of the art determines this combined error but not any of the individual components. Using the more elaborate structure of Smith, we can isolate the stage component only as discussed in depth on pages 26:32.

That we can isolate stage error is apparent only after this somewhat lengthy discussion and is by no means obvious nor in any way, suggested, taught or implied by the proposed combination.

2. The Proposed Combination Has no Reasonable Expectation of Success.

As stated above, the attributes taught in Ausschnitt are not complimentary, and by themselves cannot be used to measure X-Y shifts on an overlay metrology tool. Additionally, the teachings in Ausschnitt are principally aimed at determining CD bias or focus. To the extent that CD bias and focus are contributing to a wafer stage overlay error map, they will introduce errors in the map and be detrimental to the accurate determination of the mechanically induced stage error. The Ausschnitt reference was specifically designed to be sensitive to CD bias and would induce errors in their application to the present invention.

Further, as discussed above, the proposed combination would not have a reasonable expectation of successfully determining "a self referenced wafer stage overlay error map" As is known in the art, product wafer overlay errors are for a combination of reticle, stage, lens, and alignment mark detection errors. The proposed combination of the art determines this combined error but not any of the individual components. Using the more elaborate structure of Smith, we can isolate the stage

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component only as discussed in depth on pages 26:32. That fact that the present invention can insulate stage error is apparent only after this somewhat lengthy discussion and is by no means obvious nor in any way, suggested, taught or implied by the proposed combination of art.

Hence the combination of Ausschnitt and Templeton fails to teach an important element of independent claims 44, 50, and 51, the proposed combination would have no reasonable expectation of success in solving the problems solved by the present invention, and the obviousness rejection is traversed. The Applicant therefore respectfully requests the Examiner to reconsider and withdraw this rejection.

In paragraph 4 of the Office Action the Examiner rejects claims 45, 47, 52, and 54 under 35 U.S.C § 103(a) as being unpatentable over Ausschnitt as modified by Templeton, in view of U.S. Patent Nr. 5,700,602 ("Dao"). As discussed below, the Applicant respectfully traverses this rejection.

As discussed above, the combination of Ausschnitt and Templeton fails to teach important limitations in independent claims 44 and 51 and the proposed combination would have no reasonable expectation of success. The addition of the Dao reference does not correct these deficiencies. Stated clearly, the addition of Dao to the proposed combination fails to teach, suggest or imply complimentary pairs that interlock "after the reticle has been shifted a desired direction". The addition of the Dao reference does not teach, suggest or imply detecting "a self referenced wafer stage overlay error map". Additionally, the addition of the Dao reference does not improve the fundamental flaw within the combination of Ausschnitt and Templeton in that there would be no reasonable expectation of success for the same reasons discussed above. Therefore independent claim 44 is patentably distinct over the proposed combination of Ausschnitt, Templeton, and Dao. Since dependent claims 45, 47 52, and 54 depend from and further limit the scope of independent claims 44 and 51 respectively, the

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dependent claims are patentably distinct from the cited art by virtue of their dependency from independent claims 44 and 51. Having traversed the rejection to these dependent claims, the Applicant respectfully requests the Examiner reconsider and withdraw this rejection.

In paragraph 5 of the office action, the Examiner rejects dependent claims 46 and 53 as obvious and unpatentable under 35 U.S.C § 103(a) over the above proposed combination in further view of U.S. Patent 5,262,257 ("Fukuda"). As discussed below the Applicant respectfully traverses this rejection.

In the rejection the Examiner relies on Fukuda to provide an alignment pattern of a mask formed by a dielectric material film. As explained above, combination does not teach essential elements of the claims and would have no reasonable expectation of success. The addition of Fukuda to the proposed combination of references does not overcome these deficiencies. The Applicant submits that this rejection is traversed and respectfully requests the Examiner reconsider and withdraw this rejection.

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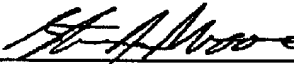
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Conclusion

Applicant believes that this Response has addressed all items in the Office Action and now places the application in condition for allowance. Accordingly, favorable reconsideration and allowance of claims 44 - 47 and 50 - 54 at an early date is solicited. No fee is believed due with this response. Should any issues remain unresolved, the Examiner is invited to telephone the undersigned.

Respectfully submitted,
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